

WHAT IS CLAIMED IS:

1. An ink for ink jet recording, the ink comprising:

a colored fine particle dispersion including at least a hydrophobic high-boiling organic solvent having a boiling point of at least 150 °C and an oil-soluble dye; and

an ionic group-containing water-insoluble polymer added to the colored fine particle dispersion.

2. The ink of claim 1, wherein the ionic group-containing water-insoluble polymer added to the colored fine particle dispersion is included in a fine particle dispersion prepared by emulsification dispersion of the ionic group-containing water-insoluble polymer.

3. An ink for ink jet recording, the ink comprising:

a colored fine particle dispersion including at least a hydrophobic high-boiling organic solvent having a boiling point of at least 150 °C and an oil-soluble dye; and

an ionic group-containing water-insoluble polymer, in which a surface of the colored fine particle dispersion is coated by the ionic group-containing water-insoluble polymer.

4. The ink of claim 1, wherein the ionic group-containing water-insoluble polymer comprises at least one of a vinyl polymer and a condensation polymer selected from the group consisting of polyurethane, polyester,

polyamide, polyurea and polycarbonate.

5. The ink of claim 1, wherein the ionic group-containing water-insoluble polymer is a self-emulsifiable water-dispersible polymer.

6. The ink of claim 1, wherein the ionic group-containing water-insoluble polymer comprises at least one of a carboxyl group and a sulfonic acid group.

7. The ink of claim 1, wherein molecular weight of the ionic group-containing water-insoluble polymer is from 1,000 to 200,000.

8. The ink of claim 1, wherein the content of the hydrophobic high-boiling organic solvent in the colored fine particles is 25 % by weight or more.

9. The ink of claim 1, wherein the ionic group-containing water-insoluble polymer comprises ionic groups in the amount of 0.1 to 3.0 mmol/g.

10. The ink of claim 1, wherein the ionic group-containing water-insoluble polymer comprises an amount of 0.1 to 30 % by weight relative to the total amount of the ink.

11. The ink of claim 1, wherein the ionic group-containing water-insoluble polymer comprises a vinyl polymer, the vinyl polymer including an ionic group selected from the group consisting of a carboxyl group, a

sulfonic acid group, a monosulfate group, $-\text{OPO}(\text{OH})_2$, a sulfinic acid group, a salt of a carboxyl group, a salt of a sulfonic acid group, a salt of a monosulfate group, a salt of $-\text{OPO}(\text{OH})_2$, a salt of a sulfinic acid group, a primary amine, a secondary amine, a tertiary amine, a salt of a primary amine, a salt of a secondary amine, a salt of a tertiary amine, and a quaternary ammonium salt.

12. The ink of claim 1, wherein the oil-soluble dye is represented by the following general formula I:

General formula I

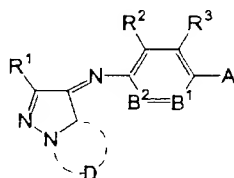


wherein X represents a residue of a color-photographic coupler; A represents $-\text{NR}^4\text{R}^5$ or a hydroxyl group; R^4 and R^5 each independently represents a hydrogen atom, an aliphatic group, an aromatic group or a heterocyclic group; B^1 represents $=\text{C}(\text{R}^6)-$ or $=\text{N}-$; B^2 represents $-\text{C}(\text{R}^7)=$ or $-\text{N}=$; R^2 , R^3 , R^6 and R^7 each independently represents a hydrogen atom, a halogen atom, an aliphatic group, an aromatic group, a heterocyclic group, a cyano group, $-\text{OR}^{51}$, $-\text{SR}^{52}$, $-\text{CO}_2\text{R}^{53}$, $-\text{OCOR}^{54}$, $-\text{NR}^{55}\text{R}^{56}$, $-\text{CONR}^{57}\text{R}^{58}$, $-\text{SO}_2\text{R}^{59}$, $-\text{SO}_2\text{NR}^{60}\text{R}^{61}$, $-\text{NR}^{62}\text{CONR}^{63}\text{R}^{64}$, $-\text{NR}^{65}\text{CO}_2\text{R}^{66}$, $-\text{COR}^{67}$, $-\text{NR}^{68}\text{COR}^{69}$ or $-\text{NR}^{70}\text{SO}_2\text{R}^{71}$; R^{51} , R^{52} , R^{53} , R^{54} , R^{55} , R^{56} , R^{57} , R^{58} , R^{59} , R^{60} , R^{61} , R^{62} , R^{63} , R^{64} , R^{65} , R^{66} , R^{67} , R^{68} , R^{69} , R^{70} and R^{71} each independently represents a hydrogen atom, an aliphatic group or an aromatic group;

and R^2 and R^3 , R^3 and R^4 , R^4 and R^5 , R^5 and R^6 , and R^6 and R^7 may be bound to each other to form a ring.

13. The ink of claim 12, wherein the oil-soluble dye represented by the general formula I comprises a compound represented by the following general formula II:

General formula II

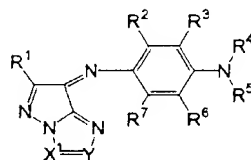


wherein R^1 represents a hydrogen atom, an aliphatic group, an aromatic group, a heterocyclic group, a cyano group, $-OR^{11}$, $-SR^{12}$, $-CO_2R^{13}$, $-OCOR^{14}$, $-NR^{15}R^{16}$, $-CONR^{17}R^{18}$, $-SO_2R^{19}$, $-SO_2NR^{20}R^{21}$, $-NR^{22}CONR^{23}R^{24}$, $-NR^{25}CO_2R^{26}$, $-COR^{27}$, $-NR^{28}COR^{29}$ or $-NR^{30}SO_2R^{31}$; R^{11} , R^{12} , R^{13} , R^{14} , R^{15} , R^{16} , R^{17} , R^{18} , R^{19} , R^{20} , R^{21} , R^{22} , R^{23} , R^{24} , R^{25} , R^{26} , R^{27} , R^{28} , R^{29} , R^{30} and R^{31} each independently represents a hydrogen atom, an aliphatic group or an aromatic group; D represents an atomic group forming a 5- or 6-membered nitrogenous heterocyclic ring which may be substituted with at least one substituent group and may further form a fused ring with another ring; at least one substituent group on the atomic group represented by D is an aliphatic group, an aromatic group, a heterocyclic group, a cyano group, $-OR^{s1}$, $-SR^{s2}$, $-CO_2R^{s3}$, $-OCOR^{s4}$, $-NR^{s5}R^{s6}$, $-CONR^{s7}R^{s8}$, $-SO_2R^{s9}$, $-SO_2NR^{s10}R^{s11}$, $-NR^{s12}CONR^{s13}R^{s14}$, $-NR^{s15}CO_2R^{s16}$, $-COR^{s17}$, $-NR^{s18}COR^{s19}$ or $-NR^{s20}SO_2R^{s21}$; and R^{s1} , R^{s2} , R^{s3} , R^{s4} , R^{s5} , R^{s6} , R^{s7} , R^{s8} , R^{s9} ,

R^{90} , R^{91} , R^{92} , R^{93} , R^{94} , R^{95} , R^{96} , R^{97} , R^{98} , R^{99} , R^{100} and R^{101} each independently represents a hydrogen atom, an aliphatic group or an aromatic group.

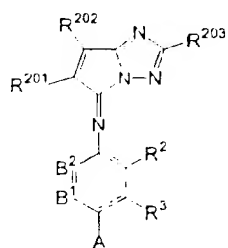
14. The ink of claim 13, wherein the compound represented by the general formula II is a compound represented by the following general formula III:

General formula III

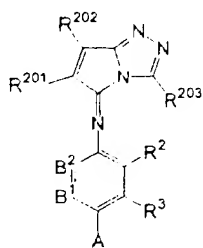


wherein one of X^1 and Y represents $-N=$ and the other represents $-C(R^8)=$, and R^8 represents a hydrogen atom, an aliphatic group or an aromatic group.

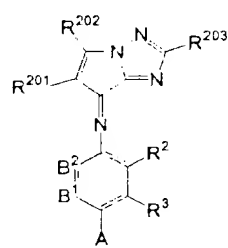
15. The ink of claim 12, wherein the oil-soluble dye represented by the general formula I comprises at least one compound represented by one of the following formulae IV-1 to IV-4:



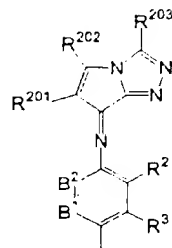
(IV-1)



(IV-2)



(IV-3)

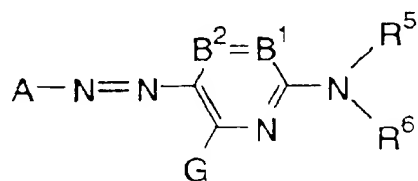


(IV-4)

wherein R^{201} , R^{202} and R^{203} each independently represents a hydrogen atom, an aliphatic group, an aromatic group, a heterocyclic group, a cyano group, $-OR^{11}$, $-SR^{12}$, $-CO_2R^{13}$, $-OCOR^{14}$, $-NR^{15}R^{16}$, $-CONR^{17}R^{18}$, $-SO_2R^{19}$, $-SO_2NR^{20}R^{21}$, $-NR^{22}CONR^{23}R^{24}$, $-NR^{25}CO_2R^{26}$, $-COR^{27}$, $-NR^{28}COR^{29}$ or $-NR^{30}SO_2R^{31}$; R^{11} , R^{12} , R^{13} , R^{14} , R^{15} , R^{16} , R^{17} , R^{18} , R^{19} , R^{20} , R^{21} , R^{22} , R^{23} , R^{24} , R^{25} , R^{26} , R^{27} , R^{28} , R^{29} , R^{30} and R^{31} each independently represents a hydrogen atom, an aliphatic group or an aromatic group; and R^{201} and R^{202} may be bound to each other to form a ring.

16. The ink of claim 1, wherein the oil-soluble dye is represented by the following general formula M-I:

General formula M-I

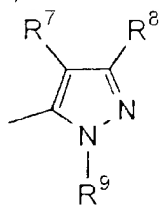


wherein A represents a residue of a 5-membered heterocyclic ring diazo component A-NH₂; B¹ represents =CR¹- and B² represents -CR²=, or B¹ represents a nitrogen atom and B² represents -CR²=, or B¹ represents =CR¹- and B² represents a nitrogen atom; R⁵ and R⁶ each independently represents a hydrogen atom, aliphatic group, aromatic group, heterocyclic group, acyl group, alkoxycarbonyl group, aryloxycarbonyl group, carbamoyl group, alkylsulfonyl group, arylsulfonyl group or sulfamoyl group, and each of these groups may have a further substituent group; G, R¹ and R² each independently represents a hydrogen atom, halogen atom, aliphatic group, aromatic group, heterocyclic group, cyano group, carboxyl group, carbamoyl group, alkoxycarbonyl group, aryloxycarbonyl group, acyl group, hydroxy group, alkoxy group, aryloxy group, silyloxy group, acyloxy group, carbomoyloxy group, heterocyclic oxy group, alkoxycarbonyloxy group, aryloxycarbonyloxy group, amino group substituted by alkyl group or aryl group or heterocyclic group, acylamino group, ureido group, sulfamoylamino group, alkoxycarbonylamino group, alkylarylsulfonylamino group, arylsulfonylamino group, aryloxycarbonylamino group, nitro group, alkylthio group, arylthio group, alkylsulfonyl group, arylsulfonyl group, alkylsulfinyl group, arylsulfinyl group, sulfamoyl group, sulfo group or heterocyclic thio group, and each of these groups may have further substituent group(s); and R¹ and R⁵ or R⁵ and R⁶ may be bonded to form a 5- or 6-membered ring.

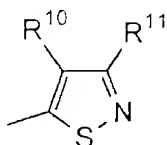
17. The ink of claim 16, wherein A in the general formula M-I is

represented by one of the following formulae M-a through M-f:

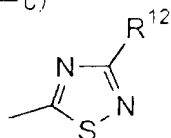
(M-a)



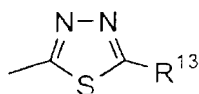
(M-b)



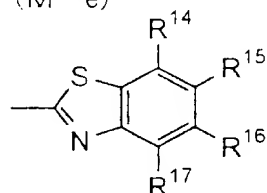
(M-c)



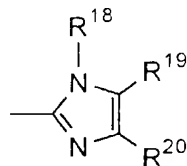
(M-d)



(M-e)



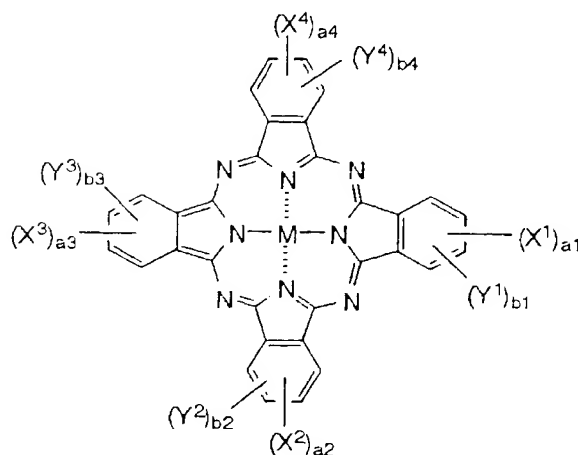
(M-f)



wherein R^7 through R^{20} each independently represents the same range of substituents as each of G , R^1 and R^2 of the general formula M-I.

18. The ink of claim 1, wherein the oil-soluble dye is represented by the following general formula C-I:

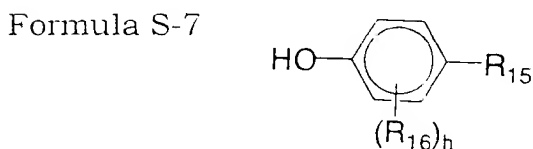
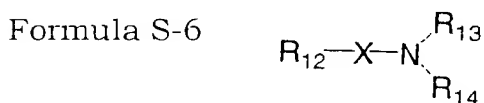
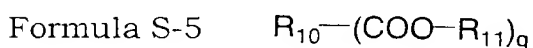
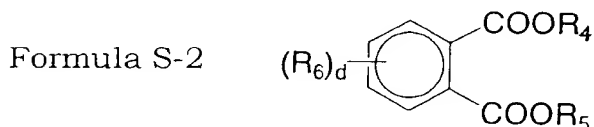
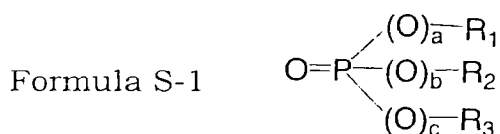
General formula C-I



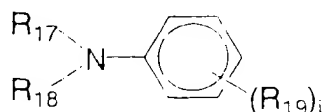
wherein X^1 , X^2 , X^3 and X^4 each independently represents $-\text{SO}-Z^1$, $-\text{SO}_2-Z^1$ or $-\text{SO}_2\text{NR}^{21}\text{R}^{22}$; each Z^1 independently represents a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted aralkyl group, a substituted or unsubstituted aryl group, or a substituted or unsubstituted heterocyclic group; each R^{21} and R^{22} each independently represents a hydrogen atom, a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted aralkyl group, a substituted or unsubstituted aryl group, or a substituted or unsubstituted heterocyclic group, and R^{21} and R^{22} are not both hydrogen atoms; Y^1 , Y^2 , Y^3 and Y^4 each represents a monovalent substituent; and a^1 , a^2 , a^3 , a^4 , b^1 , b^2 , b^3 and b^4 represent substituent numbers for X^1 , X^2 , X^3 , X^4 , Y^1 , Y^2 , Y^3 and Y^4 respectively, each substituent number being an integer from 0 to 4 and the sum of a^1 , a^2 , a^3 and a^4 being at least 2.

19. The ink of claim 1, wherein the oil-soluble dye comprises an amount of 0.1 to 20 % by weight relative to the total amount of the ink.

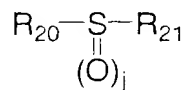
20. The ink of claim 1, wherein the hydrophobic high-boiling organic solvent comprises at least one hydrophobic high-boiling organic solvent selected from hydrophobic high-boiling organic solvents represented by the following formulae S-1 to S-9:



Formula S-8



Formula S-9



wherein:

in formula S-1, R_1 , R_2 and R_3 each independently represents an aliphatic group or aryl group, and a , b and c each independently represents 0 or 1;

in formula S-2, R_4 and R_5 each independently represents an aliphatic or aryl group, R_6 represents a halogen atom, an alkyl group, an alkoxy group, an aryloxy group, an alkoxycarbonyl group or an aryloxycarbonyl group, d is an integer from 0 to 3, and, if d is two or more, a plurality of R_6 groups may be the same as each other or different;

in formula S-3, Ar represents an aryl group, e is an integer from 1 to 6, and R_7 represents a hydrocarbon group or hydrocarbon groups bound to each other via ether linkage;

in formula S-4, R_8 represents an aliphatic group, f is an integer from 1 to 6, and R_9 represents a hydrocarbon group or hydrocarbon groups bound to each other via ether linkage;

in formula S-5, g is an integer from 2 to 6, R_{10} represents a hydrocarbon group other than an aryl group, and R_{11} represents an aliphatic group or an aryl group;

in formula S-6, R_{12} , R_{13} and R_{14} each independently represents a

hydrogen atom, an aliphatic group or an aryl group, X represents -CO- or $\text{SO}_2\text{-}$, and R_{12} and R_{13} or R_{13} and R_{14} may be bound to each other to form a ring;

in formula S-7, R_{15} represents an aliphatic group, an alkoxycarbonyl group, an aryloxycarbonyl group, an alkylsulfonyl group, an arylsulfonyl group, an aryl group or a cyano group, R_{16} represents a halogen atom, an aliphatic group, an aryl group, an alkoxy group or an aryloxy group, h is an integer from 0 to 3, and, if h is two or more, a plurality of R_{16} groups may be the same as each other or different;

in formula S-8, R_{17} and R_{18} each independently represents an aliphatic group or an aryl group, R_{19} represents a halogen atom, an aliphatic group, an aryl group, an alkoxy group or an aryloxy group, i is an integer from 0 to 4, and, if i is two or more, a plurality of R_{19} groups may be the same as each other or different;

in formula S-9, R_{20} and R_{21} each independently represents an aliphatic group or an aryl group, and j is 1 or 2;

in the formulae S-1 to S-9, in any of R_1 to R_6 , R_8 , and R_{11} to R_{21} that represents an aliphatic group or a group containing an aliphatic group, the aliphatic group may be straight-chain, branched or cyclic, may contain an unsaturated bond, and may have a substituent group; in any of R_1 to R_6 , R_8 and R_{11} to R_{21} that represents a cycloalkyl group or a group containing a cycloalkyl group, the cycloalkyl group may contain an unsaturated bond in a 3- to 8-membered ring thereof, or may have a substituent group or a crosslinking group; and in any of R_1 to R_6 , R_8 , and R_{11} to R_{21} that represents an aryl group or a group containing an aryl

group, the aryl group may be substituted; and

in the formulae S-3, S-4 and S-5, any of R_7 , R_9 and R_{10} that is a hydrocarbon group may contain a cyclic structure or an unsaturated bond or may have a substituent group.

21. The ink of claim 1, wherein the relative dielectric constant at 25 °C of the hydrophobic high-boiling organic solvent is from 3 to 12.

22. The ink of claim 1, wherein the hydrophobic high-boiling organic solvent comprises an amount of 50 to 1500 % by weight relative to the oil-soluble dye.

23. The ink of claim 1, wherein the colored fine particles comprise a content amount of 1 to 45 % by weight relative to the total amount of the ink.

24. The ink of claim 1, wherein the colored fine particle dispersion comprises colored fine particles with an average particle diameter of at most 100 nm.

25. An ink jet recording method, which comprises the steps of:

preparing a colored fine particle dispersion including at least a hydrophobic high-boiling organic solvent having a boiling point of at least 150 °C and an oil-soluble dye;

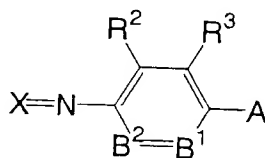
adding an ionic group-containing water-insoluble polymer to the

colored fine particle dispersion to prepare an ink; and
using the ink for ink jet recording.

26. The method of claim 25, wherein the step of using the ink for ink jet recording includes using an image-receiving material comprising a support and, on the support, an ink-receiving layer including a porous inorganic pigment.

27. The method of claim 25, wherein the oil-soluble dye is represented by the following general formula I:

General formula I

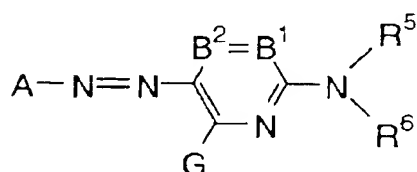


wherein X represents a residue of a color-photographic coupler; A represents $-NR^4R^5$ or a hydroxyl group; R^4 and R^5 each independently represents a hydrogen atom, an aliphatic group, an aromatic group or a heterocyclic group; B^1 represents $=C(R^6)-$ or $=N-$; B^2 represents $-C(R^7)=$ or $-N=$; R^2 , R^3 , R^6 and R^7 each independently represents a hydrogen atom, a halogen atom, an aliphatic group, an aromatic group, a heterocyclic group, a cyano group, $-OR^{51}$, $-SR^{52}$, $-CO_2R^{53}$, $-OCOR^{54}$, $-NR^{55}R^{56}$, $-CONR^{57}R^{58}$, $-SO_2R^{59}$, $-SO_2NR^{60}R^{61}$, $-NR^{62}CONR^{63}R^{64}$, $-NR^{65}CO_2R^{66}$, $-COR^{67}$, $-NR^{68}COR^{69}$ or $-NR^{70}SO_2R^{71}$; R^{51} , R^{52} , R^{53} , R^{54} , R^{55} , R^{56} , R^{57} , R^{58} , R^{59} , R^{60} , R^{61} , R^{62} , R^{63} , R^{64} , R^{65} , R^{66} , R^{67} , R^{68} , R^{69} , R^{70} and R^{71} each independently

represents a hydrogen atom, an aliphatic group or an aromatic group; and R^2 and R^3 , R^3 and R^4 , R^4 and R^5 , R^5 and R^6 , and R^6 and R^7 may be bound to each other to form a ring.

28. The method of claim 25, wherein the oil-soluble dye is represented by the following general formula M-I:

General formula M-I

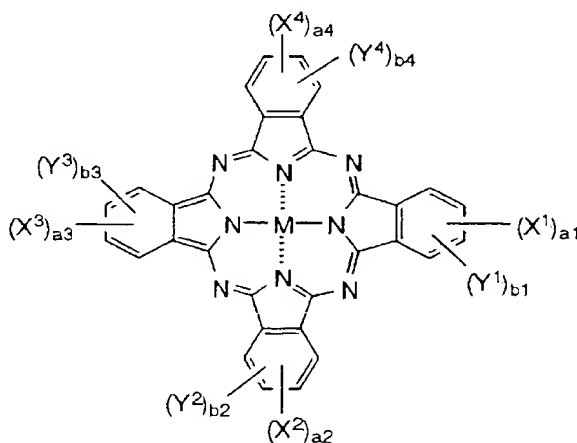


wherein A represents a residue of a 5-membered heterocyclic ring diazo component A-NH₂; B¹ represents =CR¹- and B² represents -CR²=, or B¹ represents a nitrogen atom and B² represents -CR²=, or B¹ represents =CR¹- and B² represents a nitrogen atom; R⁵ and R⁶ each independently represents a hydrogen atom, aliphatic group, aromatic group, heterocyclic group, acyl group, alkoxycarbonyl group, aryloxy carbonyl group, carbamoyl group, alkylsulfonyl group, arylsulfonyl group or sulfamoyl group, and each of these groups may have a further substituent group; G, R¹ and R² each independently represents a hydrogen atom, halogen atom, aliphatic group, aromatic group, heterocyclic group, cyano group, carboxyl group, carbamoyl group, alkoxycarbonyl group, aryloxy carbonyl group, acyl group, hydroxy group, alkoxy group, aryloxy group, silyloxy group, acyloxy group, carbomoyloxy group, heterocyclic oxy group, alkoxycarbonyloxy group, aryloxy carbonyloxy group, amino group, anilino group, acylamino group,

ureido group, sulfamoylamino group, alkoxycarbonylamino group, alkylarylsulfonylamino group, arylsulfonylamino group, aryloxycarbonylamino group, nitro group, alkylthio group, arylthio group, alkylsulfonyl group, arylsulfonyl group, alkylsulfinyl group, arylsulfinyl group, sulfamoyl group, sulfo group or heterocyclic thio group, and each of these groups may have a further substituent group; and R^1 and R^5 or R^5 and R^6 may be bonded to form a 5- or 6-membered ring.

29. The method of claim 25, wherein the oil-soluble dye is represented by the following general formula C-I:

General formula C-I



wherein X^1 , X^2 , X^3 and X^4 each independently represents $-\text{SO}-Z^1$, $-\text{SO}_2-Z^1$ or $-\text{SO}_2\text{NR}^{21}\text{R}^{22}$; each Z^1 independently represents a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted aralkyl group, a substituted or unsubstituted aryl group,

or a substituted or unsubstituted heterocyclic group; each R^{21} and R^{22} each independently represents a hydrogen atom, a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted aralkyl group, a substituted or unsubstituted aryl group, or a substituted or unsubstituted heterocyclic group, but R^{21} and R^{22} are not both hydrogen atoms; Y^1 , Y^2 , Y^3 and Y^4 each represents a monovalent substituent; and a^1 , a^2 , a^3 , a^4 , b^1 , b^2 , b^3 and b^4 represent substituent numbers for X^1 , X^2 , X^3 , X^4 , Y^1 , Y^2 , Y^3 and Y^4 respectively, each substituent number being an integer from 0 to 4 and the sum of a^1 , a^2 , a^3 and a^4 being at least 2.

30. A method of producing an ink for ink jet recording, the method comprising the steps of:

dispersing colored fine particles, which include at least a hydrophobic high-boiling organic solvent having a boiling point of at least 150 °C and an oil-soluble dye, in an aqueous medium to prepare a colored fine particle dispersion;

dispersing by emulsification of an ionic group-containing water-insoluble polymer to prepare a fine particle dispersion; and

mixing the fine particle dispersion with the colored fine particle dispersion.